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BEEKEEPING FOR BEGINNERS

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Keeping honey bees is a fascinating and profitable pastime that can be enjoyed in several ways. You may want to keep bees for the delicious fresh honey they produce, for the benefits of their valuable services as pollinators for your crops, or perhaps just for the fun of learning about one of nature's most interesting insects.

You can keep honey bees successfully almost anywhere in the United States with relatively little trouble and a minimum of expense. This bulletin supplies you with the basic information you should have to get started. As a beginning beekeeper, you will need only—

- A few dollars invested in materials.
- A suitable location for beehives.
- Elementary knowledge of the habits of honey bees.

Beekkeeping Equipment

The basic equipment you need for beginning beekeeping should cost no more than about \$60. This equipment should include the following items:

Hive, to house your bees.

Frames, and foundation to support the honeycombs in which your bees will store honey and raise young bees.

Smoker, to blow smoke into the hive, to pacify the bees when you want to work with them.

Hive tool, with which to pry frames apart, to examine the hive or harvest the honey.

Veil, to protect your face and neck from bee stings.

Gloves, to protect your hands.

Feeder, to dispense sugar sirup until bees can produce their own food.

Colony Life

Honey bees are social insects. This means that they live together in a colony and depend on each other for survival.

Most of the bees in a colony are workers (sterile females). Some are drones (males), whose only function is to mate with the queen. Usually there is one queen bee (fertile female) in the colony; she lays the eggs that maintain or increase the colony's population.

The honey bee (*Apis mellifera* Linnaeus) is man's most useful insect. In the United States alone, honey bees produce about \$50 million worth of honey and beeswax each year, and they pollinate more than \$1 billion worth of valuable agricultural crops.



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Equipment used in beekeeping.

Worker bees (sexually undeveloped females) number up to about 60,000, depending on the egg-laying ability of the colony queen, the space available in the hive for expansion, and the incoming food supply. Worker bees live about 6 weeks. They collect food and water for the entire colony, do the housework, and guard the hive against intruders. They also “air condition” the hive and maintain a constant hive temperature and humidity—whatever the conditions outside. Although worker bees do not mate, they may lay eggs if the colony loses its queen. But their eggs will not keep up the colony population, because they develop only into drones.

The number of *drones* (males) in a colony varies with the season of the year. There may be none during the winter, but several hundred during the summer. They are driven out of the hive in the fall, when worker bees can no longer collect food.

The *queen bee* normally flies from the hive when she is about a

week old and mates in the air with several drones. When she returns to the hive, she begins to lay eggs. During her lifetime she lays thousands of eggs—sometimes as many as 1,000 in a day. She puts each egg into a separate cell of the honeycomb.

Three days after an egg is laid, it hatches into a *larva*. Worker bee “nursemaids” feed and care for the larva, for 6 days. Then they seal the cell. Inside the honeycomb cell the larva transforms into a pupa. Twenty-one days from the day the egg was laid, an adult bee chews her way out of the cell.

Bee Strains

The Italian strain of bees is the most common one in the United States. These bees are hardy, industrious, relatively gentle, and yellow to brown in color.

The Caucasian strain is also widely kept. Bees in this strain are more gentle than Italian bees, and grey to black in color.

Caucasian bees sometimes use an excessive amount of propolis in their hives. They collect this gummy substance from buds and injured tree parts, and they use it



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From left: Worker, queen, and drone bees.

as a "cement" in their hives. Frames that become heavily propolized are difficult to remove.

Some specially bred hybrid bees (crosses between two or more bee strains) are available. They are usually more productive than standard strains. But after a year or two, the offspring they produce may bear no resemblance to the original hybrid bees.

If you keep hybrid bees, it is a good idea to replace your queen each year. This should assure a uniformly strong colony.

Getting Started

The best time to start keeping bees is in springtime. Fruit trees and flowers are in bloom then and should supply the new colony with sufficient nectar and pollen.

Buy a hive and the necessary equipment before springtime. When it is assembled you can buy a package of 2 or 3 pounds of bees with a queen, from another beekeeper or from a bee supplier, and put them into your hive. **Be sure the bees you buy have a certificate of inspection to indicate that they are free of bee diseases.**

Another way to begin keeping honey bees is to capture a live swarm and establish it in your hive. However, unless you have experience, don't try to catch the swarm by yourself. Try to have a beekeeper help you.

If you begin with a new swarm or package of bees, it is a good idea to provide them with a sugar sirup that is a mixture of half sugar and half water. You can put this sirup in a feeder in the

entrance of the beehive. The sirup will supply food until the bees can make and store their own honey.

How to Build a Beehive

Factory-made beehives and frames are best. Their parts are of standard size and are interchangeable.

If you prefer to build your own beehive, use a factory-made hive as a model. Reproduce all parts exactly and keep all dimensions the same, so that the parts will fit together well and be interchangeable with corresponding parts in other hives.

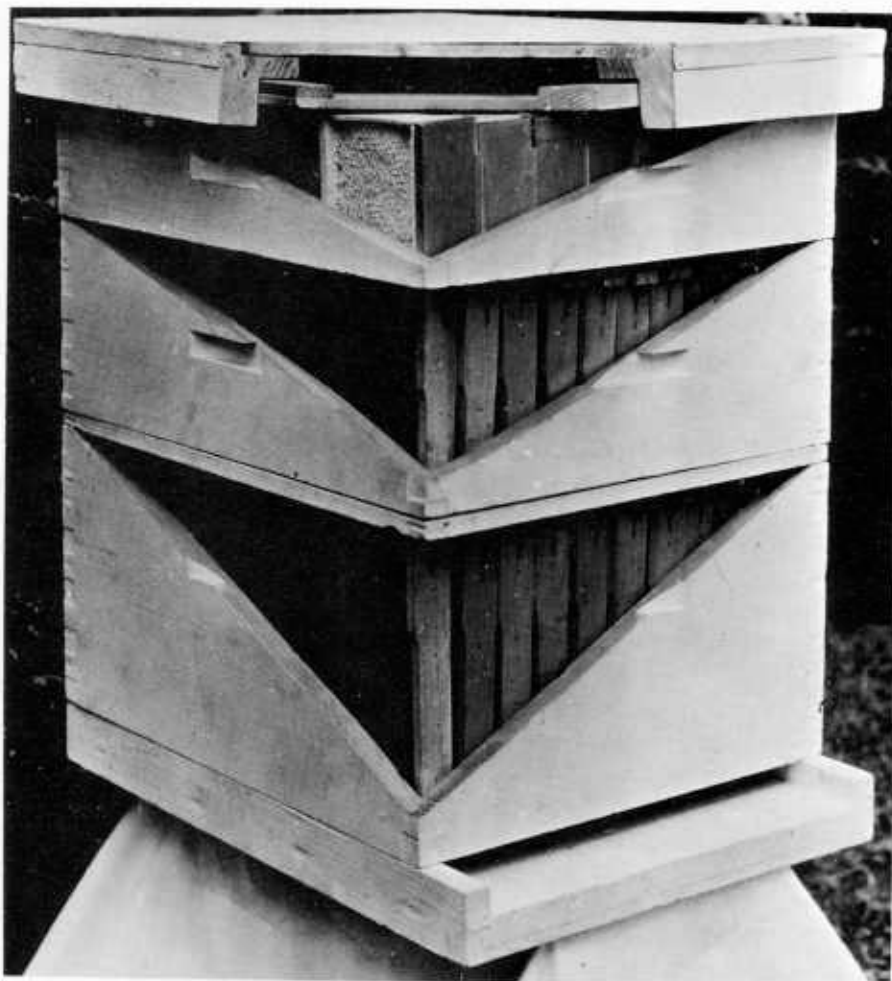
Of special importance is the space you leave between frames in your hive. It should be about one-fourth inch. If the space is less, it will be too small for the bees to pass through, and they will seal it off with propolis. If the space between frames is more than one-fourth inch, it will be too wide and your bees will build honeycomb in it. Neither of these is desirable.

The diagram on page 6 gives plans and dimensions for constructing a 10-frame beehive—the most common hive size.

Where to Keep Beehives

When your hive is stocked with a bee colony, put it where the bees are unlikely to sting anyone.

If you live in a warm area, put the hive in the shade. If you live in an area that has extended periods of freezing temperatures, expose it to the sun and protect it



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Beehive cutaway to show interior and placement of movable frames: Bottom, full-depth hive body; middle and top, shallow hive bodies.

from prevailing winds—particularly in winter.

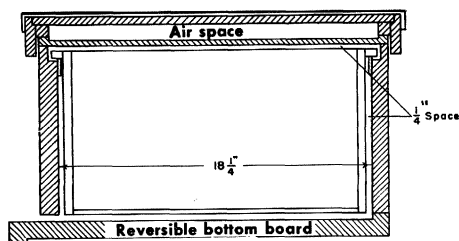
Be sure there is a constant supply of fresh, cool water nearby.

For more information, write for Leaflet No. 530, "Shade and Water for the Honey Bee Colony," available free from the

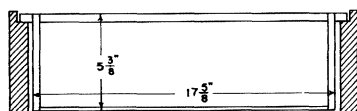
Office of Communication, U.S. Department of Agriculture, Washington, D.C. 20250.

What Bees Need

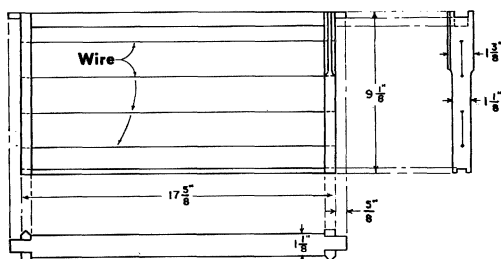
Bees need four basic materials: Nectar, pollen, propolis, and water. They make honey out of nectar. They make pollen into



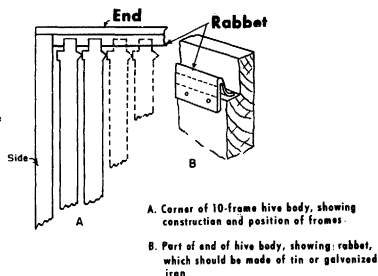
CROSS SECTION OF HIVE BODY AND FRAME



CROSS SECTION OF SHALLOW SUPER

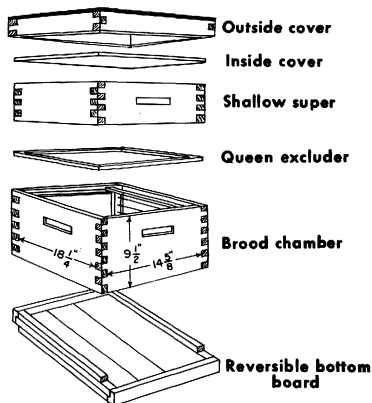


SIDE, END, AND TOP ELEVATION OF FRAME



A. Corner of 10-frame hive body, showing construction and position of frames

B. Part of end of hive body, showing rabbit, which should be made of tin or galvanized iron



Plans and dimensions for a 10-frame beehive.

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beebread (food for young bees). They use propolis to seal cracks and waterproof their hive. They dilute honey with water before eating it, and they use water in their hive "air conditioning system."

Nectar

Bees can't make honey without nectar, a liquid sugary substance produced by flowers. It is the raw material of honey and the bees' main source of food.

Several hundred kinds of plants produce nectar, but only a few kinds are common enough, or

produce enough nectar, to be considered major sources.

The best sources of nectar for producing surplus honey vary from place to place. As a beekeeper you will want to learn the plants in your area that are best for honey production. Here are some of the plants that are major nectar sources in the United States—

alfalfa
aster
buckwheat
catclaw
citrus fruit
clover

cotton
fireweed
goldenrod
holly
horsemint
locust

mesquite
palmetto
tuliptree
tupelo
sage

sourwood
star thistle
sweetclover
sumac
willow

maple
oak

poplar
willow

How Bees Make Honey and Wax

The color and flavor of honey depend on the kinds of plants that bees collect nectar from. Honey may be colorless, amber, or even reddish; its flavor can range from mild to strong.

Pollen

As worker bees gather nectar from flowers, tiny particles of pollen stick to their bodies and are accumulated in pellets on their hind legs. This pollen is carried back to the hive where the bees store it as "beebread" in cells of the honeycomb.

Later, worker bees in the hive consume the "beebread" and the nutrients in it are converted into larval food by special glands in the heads of the "nursemaids." (The few young larvae selected by the workers to become new queens are fed a greater amount of an enriched larval food commonly called royal jelly.) Pollen, therefore, is necessary for producing new bees.

An average-size colony of bees uses about 100 pounds of pollen each year. That is why you need to locate your colonies near good sources of pollen. Many wild flowers, ornamentals, weeds, shrubs, and trees will provide pollen. Some especially good sources are:

aster
corn
dandelion

fruit blossoms
goldenrod
grasses

The nectar that bees collect is generally half to three-fourths water. After nectar is carried into the hive, the bees evaporate most of the water from it. While evaporating the water, enzymes change the nectar into honey. Then the bees seal the honey into cells of the honeycomb.

Beeswax begins as a liquid made by glands on the underside of the worker bee's abdomen. As it is produced, it hardens into tiny wax scales. Worker bees then use this wax to build honeycomb.

Beekeepers often provide their bees with honeycomb foundation made of sheets of beeswax. This foundation fits into hive frames and becomes the base of the honeycomb. It enables bees to speed up comb construction, and it provides a pattern for building a straight and easy-to-remove honeycomb.

How to Move a Colony

If you need to move your bee colony get the bees oriented to the new location. Unless you move at least several miles, the bees will find their way back to their old location.

If you want to move your bees only a few hundred yards, first take them several miles away and leave them for a week or more. After they get used to the distant location, move them to the nearby

site you originally desired, and let them get oriented there.

Or, move the colony a few feet each day, until you have moved it to the location you want.

It is not advisable to move bees during the period of honey production. The honey already stored will add extra weight; new honeycomb may break loose; and you will disturb your bees and cause a slowdown in honey storage.

Night is the best time to move a colony. All the bees are inside then. If the weather is cold, you can completely close the hive entrance.

If the weather is unseasonably warm and the colony strong, do not seal the hive entrance. You might suffocate your bees, even if you seal them in for only an hour. Instead, cover the entrance and replace the cover of the hive with a fine screen.

Staple, crate, or tie the hive in advance so that parts cannot shift during the move.

How to Manage a Colony

As your bee colony grows, it will need more room. If the bees become too crowded and there isn't enough room for expansion of the brood-rearing area, they will swarm (fly off in large numbers, along with the queen, to start a new colony). You should prevent this, if possible. Loss of a swarm of bees may leave the remaining colony too weak to store surplus honey.

To make more room for your bees, add extra boxes of combs (supers) to the hive, or onto the supers already in place.

Always leave plenty of honey for the bees. Remove only the amount that you estimate as surplus to their needs. *Be sure there are at least 50 pounds of honey in the hive when winter begins;* otherwise, your bees might starve before springtime.

Since one frame holds 3 to 5 pounds of honey, an average size colony needs about 10 to 15 frames of honey to get through a winter.

Comb honey

Some beekeepers produce comb honey by cutting out pieces of honeycomb, putting them in glass containers, and pouring liquid honey around them.

Another method of producing comb honey is to place small wooden boxes or "sections" in the top of the hive just as the honey flow begins (illustration, p. 5). In a good flow—bees will neatly fill the sections with honey—about a pound in each section. If you remove the sections as soon as they are filled, you will have no problem with honey dripping or leaking, and no further handling or processing will be necessary.

The best way for the beginner to produce comb honey is in shallow frames containing "thin-super" (or comb honey) foundation. When these are filled and removed they can be sold (or given away) intact or cut into drained squares wrapped in plastic film.

Granulated honey

Honey tastes best when it is fresh, whether in the comb or in

liquid form. But some honeys, even when fresh, granulate or become sugary—and most honeys will granulate sooner or later. The size of granules that form and their appearance and flavor depend on the kinds of plants that the bees collected nectar from.

Granulated honey is good food. In fact, some people prefer it to either liquid or comb honey. But if your honey granulates and you do not prefer it this way, liquefy it by this method:

- Place jars of granulated honey in a container with enough water to reach to the level of honey in the jars. Support the jars so they do not rest directly on the bottom of the container, and so water can circulate beneath them.

- Heat gently, until granules have disappeared. (The time required will vary, depending on the size of the jars of honey, and the temperature to which you heat them. DO NOT heat water above 160° F.; excessive heating will darken your honey and lower its quality.)

- Stir occasionally, to distribute heat evenly throughout the honey, and to determine when the granules have disappeared.

How to Deal with Stings

The sting is a weapon for defense of the colony. In order to reduce the likelihood of its being used on you, keep the following principles in mind:

Try to work the bees when they are flying actively in favorable weather.

Wear protective clothing: A

veil over your head and face, gloves for your hands (which you will quickly discard with experience); and closewoven, light-colored clothing sealed at the ankles and wrists.

Always use a smoker when working with the bees:

Direct smoke into the hive entrance before disturbing the bees.

As you remove the hive cover or a super, apply smoke gently to the exposed bees.

Don't oversmoke — use just enough—this will come with experience.

If you are stung, remove the stinger immediately by scraping it off with your fingernail or any straight edged instrument. Do not try to pull it out, because this will force more venom into your skin.

Since the stinger is barbed, rapid removal can greatly reduce the effect of the sting.

Most beekeepers eventually develop immunity to stings after a few seasons. However, if you become allergic to bee stings, consult an allergy specialist before you become committed to beekeeping.

Bee Diseases and Pests

Several diseases attack honey bees. None of them are dangerous to humans.

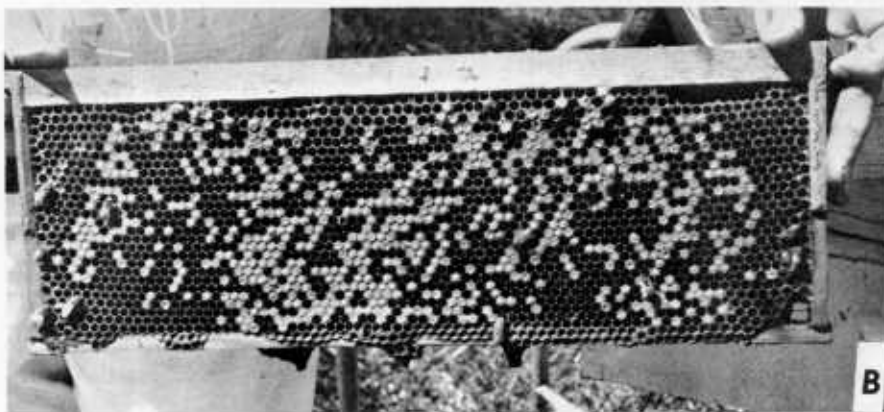
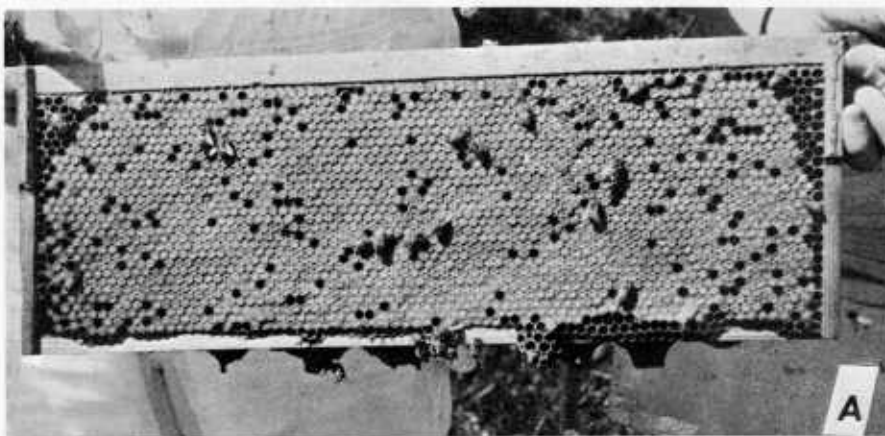
Most States have laws to control bee diseases and to prevent their spread. In many States it is illegal to offer for sale bee col-

onies and equipment that are not certified free of disease. Before you buy or sell bees, notify your State or local bee inspector.

If you need more specific information on bee diseases, consult your county agricultural agent. Or write for a copy of FB 2255, "Identification and Control of Honey Bee Diseases," available from the Superintendent of Documents, U.S. Government Print-

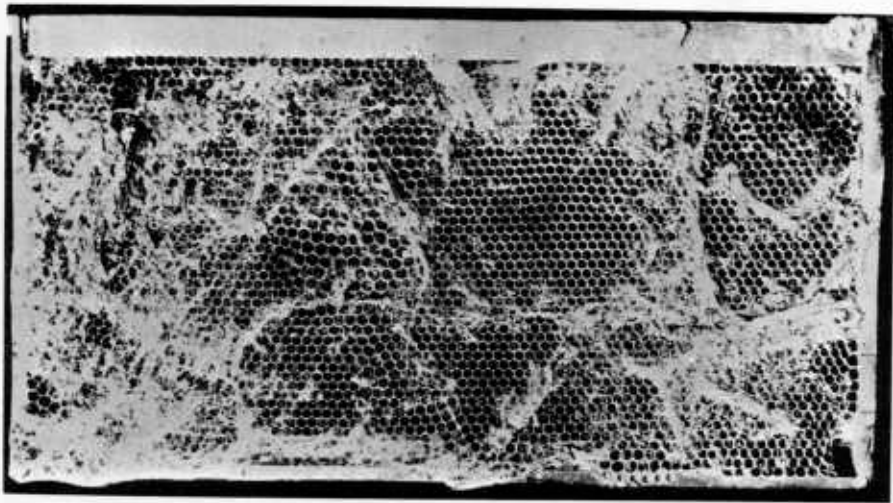
ing Office, Washington, D.C. 20402.

Keep your colonies strong. This is good beekeeping practice. It is also your best protection against wax moths, the serious insect pests that invade unprotected honeycombs. To learn more about the wax moth, write for FB 2217, "Controlling the Greater Wax Moth," available from the Superintendent of Doc-



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Brood combs showing (A) healthy brood necessary for high-honey production and (B) diseased brood, which results in weakened colonies and low-honey production.



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Brood comb infested with greater wax moth larvae.

uments, U.S. Government Printing Office, Washington, D.C. 20402. Include your return address and ZIP code.

Learn More About Beekeeping

A good way to get information on keeping bees in your area is to talk with a local beekeeper. He will be glad to show you how to open a hive and handle the bees, how to reduce swarming, and how to get honey out of the hive.

Your county agricultural agent should be able to supply you with pamphlets or direct you to other information sources. Or you may find that you can take a correspondence course in beekeeping at your State agricultural college.

You will also find it useful and enjoyable to join a beekeepers organization; most States have one or more. And you can subscribe to bee journals, or borrow

beekeeping magazines or textbooks from your public library.

More complete information on all phases of beekeeping is available in Agriculture Handbook No. 335, "Beekeeping in the United States." It is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Price, \$1.50.

USDA Bee Laboratories

Department of Agriculture research on beekeeping and insect pollination is conducted in laboratories across the country, usually in cooperation with State agricultural experiment stations or universities. A list of USDA bee research laboratories follows.

- Arizona—Bee Research Laboratory, University of Arizona, 2000 East Allen Road, Tucson, Ariz. 85721.
- Louisiana—Bee Breeding Laboratory, Room 240, Agricultural Center, Louisiana State University, Baton Rouge, La. 70803.
Bee Stock Investigations Laboratory, RR 3, Box 82-B, Ben Hur Road, Baton Rouge, La. 70803.
- Maryland—Bioenvironmental Bee Laboratory, Room 200 Building 476, Agricultural Research Center, East Beltsville, Md. 20705.
- Utah—Bee Biology & Systematics Laboratory, U.M.C. 53, Room 261, Utah State University, Logan, Utah 84322.
- Wisconsin—Bee Management Laboratory, Room 436, Russell Laboratories, University of Wisconsin, Madison, Wis. 53706.
- Wyoming—Bee Disease Laboratory, University Station, Post Office Box 3168, Laramie, Wyo. 82071.

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